EUROSTER 11WB

Installation and operation manual

MANUFACTURER: P.H.P.U. AS, ul. Polanka 8a/3, 61-131 Poznań, Poland

Manual version: 11.05.2013.

1. INTRODUCTION

In order to ensure proper operation of the controller and of the CH and DHW systems, please read this manual carefully.

2. APPLICATION

EUROSTER 11WB is a state-of-the-art microprocessor-based controller designed for interoperation with Central Heating (CH) coal- and pulverized coal-fired boilers in systems equipped with furnace blowers and a domestic hot water (DHW) tank.
The controller measures the temperature in the boiler and in the DHW tank. Depending on these temperatures, it adjusts the air flow to the furnace and controls the operation of the CH and DHW circulation pumps.

EUROSTER 11WB controller is equipped with an Anti-Stop function that prevents seizing of an idle pump rotor. It automatically turns the pumps on for 30 seconds every 14 days when the heating season is over. Keep the controller turned on to allow the function operation after the heating season.

3. CONTROLLER FUNCTIONS

- ensure smooth adjustment of the blower rotational speed
- ensure optimum operation of the boiler
- prevent boiler condensation (sweating)
- prevent boiler overheating – thermal protection
- maintain constant water temperature in the tank
- activate the DHW priority function
- protect tank against cooling down
- provide frost protection
- provide the Anti-Stop function – protection of the blower and pumps against seizure
- ensure comfortable presetting with a knob
- perform operation tests of the pumps and of the blower
- provide temperature readings correction

4. VISIBLE ELEMENTS

1. 230 V 50 Hz power cable of the controller
2. 230 V 50 Hz power cable of the CH pump
3. 230 V 50 Hz power cable of the DHW pump
4. 230 V 50 Hz power cable of the blower
5. Thermal protection cable
6. DHW temperature sensor cable
7. CH temperature sensor cable
8. Power switch
9. LCD
10. Knob

The display backlight turns off by default after one minute following the end of the controller operation. The controller enables turning permanent backlight on. (section 8)

5. CONTROLLER INSTALLATION

Hazardous voltage is present inside the controller and on its output cables. Therefore, it is absolutely forbidden to install the device prior to disconnecting its power supply. Such installation must be performed by qualified technicians only. Do not install a controller showing signs of any mechanical damage.

a) mounting the controller:

- using a pair of screws mount the controller box on a wall or any other supporting structure (screw anchors with screws are supplied with the controller);
- using fasteners fix controller cables to the wall.

b) fixing the sensors:

- **do not immerse the sensors in liquids nor install them at flue gas outlets to the stack;**
- fix the CH sensor on the boiler in a point specially designed for that purpose or on an unshielded outlet pipe of the CH boiler (as close to the boiler as possible);
- fix the DHW sensor on the tank point specially designed for that purpose;
- using hose clips tighten the sensors to the pipe and cover them with thermal insulation.

c) connecting power cables to the pumps:

- connect the yellow or yellow-green wire (protective cable) with the terminal (⏚);
- connect the blue wire to the terminal (N);
- connect the brown wire to the terminal (L);

d) connecting the power cable to the blower:

- connect the yellow or yellow-green wire (protective cable) with the terminal (⏚);
- connect the blue wire to the terminal (N);
- connect the brown wire to the terminal (L);

e) checking the connection:

- check whether the cables have been connected correctly and tighten the covers of terminal boxes of the pumps and of the blower.

f) connecting the controller:

- **after securing the cables against any accidental rupture,** connect the power cable to a 230 V / 50 Hz socket with an earthing pin.

g) connecting the thermal protection:

- fix a bimetallic circuit breaker along with a temperature sensor on the boiler in a point specially designed for that purpose or on an unshielded outlet pipe of the CH boiler (as close to the boiler as possible);
- put the bimetallic circuit breaker against the pipe (the side without 90 °C label facing the pipe), using hose clips fix it tight to the pipe and cover with thermal insulation.

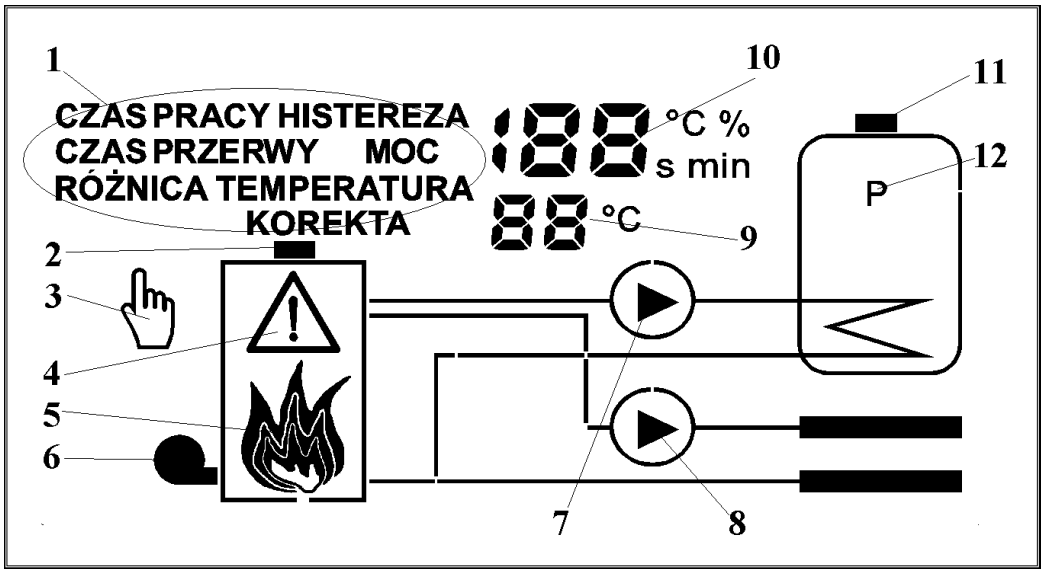
⚠ **Caution! Failure to meet the above requirements may result in malfunction of the thermal protection.**

⚠ **Caution! The voltage of the cable is 230 V. In case of damage to the cable or its extension make sure to disconnect power supply from the controller.**

Ambient temperature in a place of the controller installation should not exceed 40 °C.

6. DISPLAY DESCRIPTION

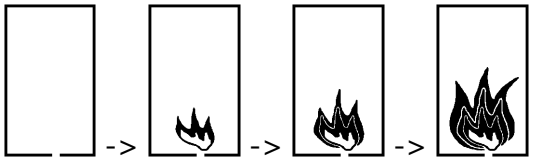
Active elements of the display are presented below:



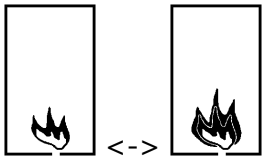
1. Name of the set parameter – displayed while previewing or changing the setting
2. Boiler temperature sensor icon
3. Manual operation mode icon – lit while the temperature is manually adjusted
4. Alarm icon – blinks in case of alarm
5. Furnace status display – see the description below
6. Blower icon – lit at the time of blower operation
7. DHW pump icon – lit at the time of pump operation
8. CH pump icon – lit at the time of pump operation
9. Tank temperature / Menu item number
10. Boiler temperature / Value of the displayed parameter
11. DHW tank temperature sensor icon
12. "DHW priority" operation mode switch-on icon

The furnace status is displayed in the form of animation.

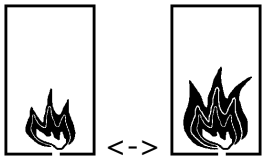
Firing-up – the boiler has not yet reached its preset temperature:



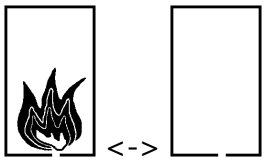
Operation – the furnace temperature is near to the preset (within the hysteresis range):



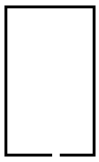
Blow-throughs – the furnace temperature has exceeded the preset by more than at least a half of the hysteresis value



Overheating – the furnace temperature > 90 °C



Shutdown – failure to reach the preset temperature of the boiler within an hour or the temperature of the furnace dropped below the shutdown temperature (setting No. 15).



7. TURNING THE CONTROLLER ON

- Turn the controller power switch (7) into the "I" position.
- A device firmware version number and its compilation date are sequentially displayed for 2 seconds after turning on.
- The ANTI-STOP function turns the pumps on for 30 seconds – "AS" letters are blinking on the display.
- The system status is presented at the display.
- Adjust the controller settings when turning the controller on for the first time (section 9).

8. RESTORING FACTORY SETTINGS / PERMANENT LIGHT-UP OF THE DISPLAY

Proceed as follows to restore factory settings, if needed:

- Keep the knob pressed and turn the controller off and on. **"Fd"** (Factory defaults) will be displayed and once the knob is released, 0 will appear.
- Use the knob to select the number (0 or 1) and confirm.
  Selecting 0 enables to change screen backlight functions without restoring factory defaults. Selecting 1 restores factory settings.
- **"bl"** (Backlight) will be displayed and once the knob is released, 0 will appear.
- Use the knob to select the required number (0 or 1) and confirm. Selecting 0 results in automatic screen backlight switch off after 1 minute of finishing operating the controller, and selecting 1 results in permanent backlight of the display.
- Control and possibly correct the remaining controller settings.

In case of lack of confirmation within 5 seconds, the controller resumes operation without introducing changes.

9. CONTROLLER SETTINGS

After being switched on the controller shows the system status. Turn the knob right to enter the setting preview and change mode.
The controller configuration is specified below: Turn the knob in order to choose the required parameter. The controller will show the value (at the top) and number (at the bottom). In order to change the value of the displayed parameter, push the knob (the parameter value will start blinking), set the required value and confirm the selection by pressing the knob. If the current value should not be changed (cancellation of changes), do not push the knob, but wait 10 seconds for the setting to stop blinking.
Setting windows are numbered for convenient operation of the controller.
The user can change the following parameters:

1. **Boiler target temperature for CH operation**
   It is the temperature of the boiler to be maintained by the controller. In case of operation in the DHW priority mode, the controller can maintain a higher temperature to heat up the tank.
2. **Hysteresis of the blower operation**
   This is a temperature range in which the controller linearly adjusts the blower power. The narrower the temperature range, the smaller the system temperature fluctuations. However, a too narrow range may result in the temperature oscillation – the controller will alternately heat up and cool down the boiler.
   At the time of installation, set the maximum hysteresis value. Wait for the installation temperature to reach a stable value. If, under such conditions, the blower operates at a power level between settings No. (3) and (4), the hysteresis may be reduced.
3. **Minimum power of the blower**
   This is the lowest power at which the blower may operate. It should be set at minimum value at which the blower rotor starts to rotate. This value should be selected experimentally using the blower test function (setting No. 16).
4. **Maximum power of the blower**
   This is the highest power at which the blower may operate. The value should be selected experimentally so that the boiler temperature maintained by the controller is as close to the preset temperature as possible.
5. **Blow-through time**
   This is a period of the blower operation in the blow-through mode. The blower is turned on in order to remove combustion gases from the boiler. The blow-through time should be long enough to effectively exhaust the gases via the stack and short enough to prevent the boiler temperature rise.
6. **Time interval between successive blow-throughs**
   This is the time passing between the end of the blow-through cycle and the start of a new cycle. It should be set so that to prevent the boiler temperature rise, but on the other hand to avoid explosive combustion of the gases generated in the boiler.
7. **DHW tank temperature**
   This is an average DHW tank temperature to be maintained by the controller.
   ATTENTION: Maintaining a low temperature in the tank (at a level of 35-40 °C) facilitates the development of bacterial flora, including Legionella.
8. **Hysteresis of the DHW tank pump**
   Difference between the temperature at which the pump is turned off and turned on, provided that the boiler is hot enough to enable heating of the tank (taking setting No. 9 into account).
   The conditions of turning the pump on and off are specified in section 13.
9. **Boiler and tank differential temperature**
   This is the value by which the boiler temperature should exceed the tank temperature (plus the constant parameter of 3 °C) to enable filling of the tank without a risk that it will chill out. Alternately, in case of increase of the DHW tank temperature or decrease of the boiler temperature this differential value (minus the constant parameter of 3 °C) specifies the temperature at which the filling cycle will be interrupted.
10. **DHW heating priority**
    Activation of the DHW priority results in faster heat up of the cold DHW tank, by turning the CH pump off and increasing the boiler preset temperature.
    After heating up of the tank to the desired temperature, the controller resumes to normal operation.
    If the DHW priority is turned off, the DHW pump is started when the tank temperature is low and the boiler temperature is high enough.
11. **CH pump operation temperature**
    The conditions of turning the pump on and off are specified in section 13.
12. **CH pump hysteresis**
    This is a differential temperature at which the controller turns the pump on and off.
    The conditions of turning the pump on and off are specified in section 13.

13. **Temperature readings correction – CH sensor**
    This is a value added to or subtracted from the measured temperature value. It enables to compensate for the difference in readings between the sensor placed on the pipe and the thermometer installed on the boiler.
14. **Temperature readings correction – DHW sensor**
    This is a value added to or subtracted from the measured temperature value. It enables to compensate for the difference in readings between the sensor placed in the tank and the thermometer of the tank.
15. **Shutdown temperature**
    This is a temperature below which the controller turns the boiler off (the boiler furnace is most probably shut down). A too high shutdown temperature preset may cause the controller to turn the boiler off by mistake.
16. **Blower operation / test**
    Displays the current status of the blower calculated by the controller (0-100 %). Press the knob to activate testing of the output. Press the knob again or leave it inactive for 10 seconds to resume automatic operation.
17. **DHW pump operation / test**
    Displays the current status of the pump calculated by the controller (0 or 1).
    Press the knob to activate testing of the output. Press the knob again or leave it inactive for 10 seconds to resume automatic operation.
18. **CH pump operation / test**
    Displays the current status of the pump calculated by the controller (0 or 1).
    Press the knob to activate testing of the output. Press the knob again or leave it inactive for 10 seconds to resume automatic operation.

ATTENTION: In case the set values preclude the correct operation of the controller, the alarm icon will appear on the display, and the colliding settings will be displayed alternately. After a few seconds the last correct configuration is restored.

All the settings are listed below:

Setting		**Value**			
Number	**Name**	**Default**	**Minimum**	**Maximum**	**Unit**
1.	Boiler target temperature	50	40	80	°C
2.	Hysteresis of the blower operation	6	2	10	°C
3.	Minimum power of the blower	45	30	100	%
4.	Maximum power of the blower	100	30	100	%
5.	Blow-through time (blower operation period)	10	0	120	s
6.	Time interval between successive blow-throughs	6	0	30	min.
7.	DHW tank temperature	60	20	70	°C
8.	Hysteresis of the DHW pump	4	2	10	°C
9.	Surplus (boiler and tank differential temperature)	10	3	10	°C
10.	DHW heating priority	1 [1)]	0 [1)]	1 [1)]	-
11.	CH pump operation temperature	40	20	80	°C
12.	CH pump hysteresis	4	2	10	°C

Setting		Value			
Number	**Name**	**Default**	**Minimum**	**Maximum**	**Unit**
13.	CH temperature readings correction	0	-5	5	°C
14.	DHW temperature readings correction	0	-5	5	°C
15.	Shutdown temperature	35	30	50	°C
16.	Fan operation / test	-	0	100	%
17.	DHW pump operation / test	- [2)]	0 [1)]	1 [1)]	-
18.	CH pump operation / test	- [2)]	0 [1)]	1 [1)]	-

[1)] 1 means on, 0 means off
[2)] Displayed value is calculated by the controller

10. FIRING-UP

During firing-up in order to heat up the boiler as fast as possible the blower is operated at its highest power level.
The firing-up procedure may be initiated exclusively when the controller is in the shutdown mode – the blower is not running and the flame icon is not displayed.
Firing-up can be initiated in two ways:

- turn the controller knob all the way to the left, then press it and hold down until the blower is started;
- turn the controller power off and on.

Firing-up is terminated if:

- the boiler temperature is lower than the set temperature (1) by at most a half of the hysteresis value (2);
- within 1 hour the boiler has not reached the set shutdown temperature (setting No. 15).

If for any reason the temperature of the shutdown boiler exceeds the set shutdown temperature (setting No. 15), e.g. by self firing-up, then the controller will automatically resume the normal operation mode, i.e. the pumps will not be turned off.

11. FUELING

Turn the blower off for the time the furnace is loaded with new fuel. For this purpose turn the knob all the way to the left while the controller is in the operating mode (flame icon displayed), then press the knob and hold it down until the flame icon disappears. The blower icon and the hand icon are blinking alternately, which means that the blower was turned off manually; all other algorithms are operating normally.
Proceed as above to turn the blower on. After turning the blower on again, the controller initiates the firing-up mode in order to fire up the new batch of fuel as soon as possible. If the fire goes out, the controller will turn the blower off.

ATTENTION: The controller will not turn the blower on automatically if it was previously manually turned off by the user.

12. BLOWER CONTROL

The boiler temperature is maintained by adjusting the amount of air blown and by controlling the pumps.
In the firing-up mode when the temperature is low and the boiler may sweat, the blower is operating with its full power (determined by setting No. 4). Thus the firing-up period is as short as possible.
If the boiler temperature is close to the set temperature, within the hysteresis range, the controller adjusts the air flow smoothly. The range of the blower power control is limited by two settings: the minimum blower power (3) and the maximum blower power (4).

Exceeding the boiler temperature results in turning into the blow-through operation. In this operation mode the blower is started only to remove combustion gases out of the furnace. Blow-through cycle parameters should be set so that the boiler temperature drops to the level at which the blower operates with a linear rotational speed adjustment.
If the boiler temperature exceeds the alarm temperature, the blower is turned off permanently. Overheating is indicated by display blinking.
The boiler temperature drop below the shutdown temperature setting (setting No. 15) turns the blower off. The pumps operate according to the settings.

13. PUMPS CONTROL

The controller monitors the temperature in the tank and in the boiler on an ongoing basis.

The CH pump is turned on if the boiler temperature exceeds the preset value by a half of the set hysteresis $T_{boiler} \geq T_{CH} + H_{CH}/2$
The CH pump is turned off if the boiler temperature drops below the preset value by a half of the preset hysteresis $T_{boiler} \leq T_{CH} - H_{CH}/2$

Decision to turn the DHW pump on is made in two steps:

- The tank should be heat up if the tank temperature is lower than the preset value by at least a half of the preset hysteresis, $T_{tank} \leq T_{DHW} - H_{DHW}/2$. In this case, if the DHW heating priority is active, then the operation of the CH pump is stopped.
  Heating up of the tank can be stopped if the tank temperature is higher than the preset value by at least a half of the preset hysteresis, $T_{tank} \geq T_{DHW} + H_{DHW}/2$.
- The pump can be turned on without a risk of cooling the tank down, provided that the temperature of the heat source exceeds the tank temperature by at least the value of the preset **Difference (9)** plus 3 °C, $T_{boiler} - T_{tank} \geq T_{difference} + 3$.
  The pump cannot be turned on without a risk of cooling the tank down, provided that the temperature of the heat source does not exceed the tank temperature by at least the value of the preset **Difference (9)** minus 3 °C, $T_{boiler} - T_{tank} \geq T_{difference} - 3$.

Frost protection

The frost protection function is activated when the temperature of a given sensor falls to 4 °C. If the boiler sensor (CH) reaches such temperature, the CH and DHW pumps are activated and "AF" letters (Anti-Freeze) are displayed. For the (DHW) tank sensor only the DHW pump is started. The protection is turned off when the temperature rises to 6 °C.

14. POWER ALARM TEMPERATURE

In case the temperature measured by the boiler sensor exceeds the alarm temperature (90 °C), the CH and DHW pumps are turned on irrespective of the priority, the blow-throughs are turned off, and additionally the thermal protection feature interrupts the blower power supply until the temperature drops to 60 °C.

15. SUMMER SEASON OPERATION

In order to disable the CH system operation for the summer season, set the temperature of the CH pump operation (11) higher than the settings of the DHW tank and of the boiler, e.g. to 80 °C. This will enable the DHW tank to heat up quickly and the boiler will be protected against high temperature.

16. ANTI-STOP

Each time the controller is turned on, the ANTI-STOP function immediately turns the pumps on for 30 seconds (also after restoring factory defaults or change of the backlight type); later the operation is repeated every 14 days. "AS" letters are blinking on the display while the function is active.

Any alarm generated while the ANTI-STOP function is active (overheating or sensor damage) aborts the function operation.

17. TROUBLESHOOTING

Device does not work
Burnt fuse or ROM failure – send the device to the service.

The display blinks along with the sensor icon, "Sh" or "OP" letters appear
Sensor circuit shorted (**Sh**) or opened (**OP**) – check the adequate sensor cable with the blinking icon or send the device along with the sensors to the service.

Pump or blower does not work
The device is turned off – make sure that the proper icons are displayed. If not – check the settings. Restore factory settings (section 8).
Wrong connection – check.
Thermal protection activation – wait for the temperature decrease.

Blower operates continuously
Time interval between blow-throughs (setting No. 6) set at 0 – adjust the value.

Boiler is overheating
The blow-through time setting (5) is too long or the time interval between blow-throughs is too short (setting No. 6) – adjust the value.
The blower power too high – adjust the preset values of the power of the blower (3) and (4); throttle back the blower.

Controller emits a buzzing sound
Loose coils in the interference filter – does not impact the correct operation of the device.

Controller knob operates erratically
Pulse generator damage – send the device to the service.

18. STANDARDS AND CERTIFICATES

EUROSTER 11WBcontroller conforms to the following EU Directives: EMC, LVD and RoHS.
The EC Declaration of Conformity is published and available at:

http://www.euroster.com.pl

19. TECHNICAL DATA

Controlled device	CH pump, blower, DHW pump
Supply voltage	230 V 50 Hz
Maximum pumps output load	2 A 230 V 50 Hz
Maximum blower output load	0.5 A 230 V 50 Hz
Maximum power consumption	1.6 W
Temperature measurement range	from -5 °C to +110 °C
Temperature adjustment range	CH mode: from +20 °C to +80 °C DHW mode: from +20 °C to +70 °C
Boiler temperature adjustment range	from +40 °C to +80 °C
Temperature adjustment accuracy	1 °C
Hysteresis range	from 2 °C to 10 °C
Visual signalization	backlit LCD
Operation temperature	from +5 °C to +40 °C
Storage temperature	from 0 °C to +65 °C
Ingress protection rating	IP40, Protection Class II
Color	black
Mounting method	wall-mounted, screw anchors
Weight of the controller with cables	0.86 kg
Length of cables	controller power cable: 1.5 m CH pump power cable: 1.5 m DHW pump power cable: 1.5 m blower power cable: 1.5 m thermal protection cable: 1.5 m

	tank temperature sensor: 5 m boiler temperature sensor: 1.5 m
Standards, approvals, certificates	conformity to EMC, LVD and RoHS
Warranty period	2 years
Dimensions (width / height / depth) mm	150 / 90 / 52

It is recommended to use fans equipped with a reactive power compensation circuit.

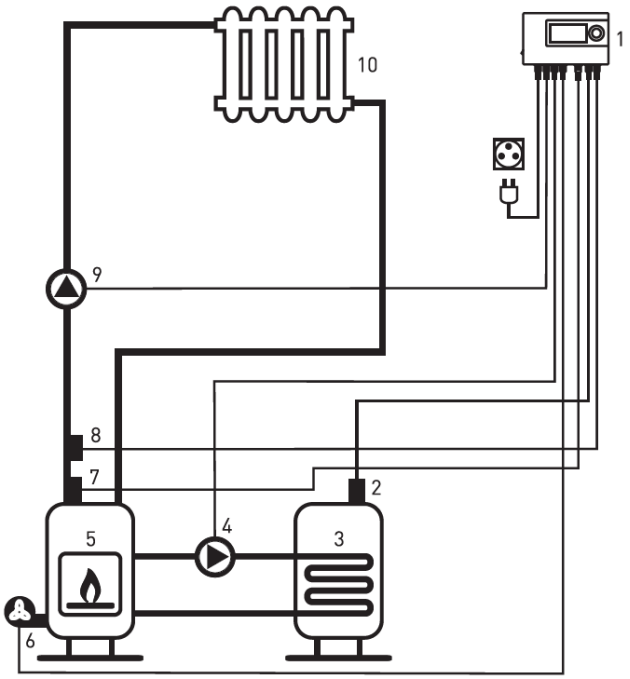
Feeding the controller (also in the emergency mode) with a non-sinusoidal voltage may result in increased energy losses in the pumps and in the fan, and contribute to malfunction of the whole system.

20. KIT CONTENTS

a) controller with 2 temperature sensors
b) sensor hose clips
c) screw anchors
d) manual
e) mounting template

21. CONNECTION DIAGRAM

The following diagram is simplified and does not cover all the elements necessary for the correct operation of the system.



1. **EUROSTER 11WB** controller
2. DHW tank temperature sensor
3. DHW tank
4. DHW tank filling pump
5. CH boiler
6. Blower
7. Protection
8. Temperature sensor
9. CH pump
10. Heat consumer – radiator

22. ELECTRONIC WASTE MANAGEMENT INFORMATION

We made every effort to ensure that this controller lifetime is as long as possible. However, the device is subject to natural wear. If the device would not meet your requirements any more, you are kindly requested to have it brought in to an electronic waste management facility. Electronic waste is collected free of charge by local distributors of electronic equipment.
Inappropriate management of electronic waste may lead to an unnecessary pollution of the natural environment.
Cardboard boxes must be disposed at a paper recycling facility.

WARRANTY CERTIFICATE

EUROSTER 11WB

Warranty terms:

1. The warranty is valid for 24 months from the device sale date.
2. Rights ensuing from this warranty are implemented within the territory of the Republic of Poland.
3. Claimed controller together with this warranty certificate must be supplied to the seller or directly to the manufacturer.
4. Warranty claims shall be processed within 14 business days from the date the manufacturer has received the claimed device.
5. The device may be repaired exclusively by the manufacturer or by other party clearly authorized by the manufacturer.
6. Warranty becomes invalidated in case of any mechanical damage, incorrect operation and/or making any repairs by unauthorized persons.
7. This consumer warranty does not exclude, restrict nor suspend any right of the Buyer ensuing if the product would not meet any of the sale contract terms.

.....

sale date	serial number / date of manufacture	stamp and signature	service: telephone No. 65-571-20-12

Business entity that issued this warranty certificate is: P.H.P.U. AS Agnieszka Szymańska-Kaczyńska, Chumiętki 4, 63-840 Krobia, Poland